


<p>Carnegie Mellon University Environmental Health & Safety FIRE LAB WORK </p>	<p>Environmental Health and Safety Chemical Exposure Monitoring – Guideline</p>
<p>Date of Issuance: 10/2019</p>	<p>Revision Date: 10/27/2020</p>
<p>Revision Number: 1</p>	<p>Prepared by: EHS</p>

1. Purpose

Carnegie Mellon University has developed this guideline to measure workplace exposures to hazardous chemicals and evaluate available exposure controls at Carnegie Mellon University.

2. Scope

This guideline applies to personnel at Carnegie Mellon University whose duties require the use and handling of hazardous chemicals. Specifically, this applies to OSHA regulated carcinogens and other regulated carcinogens. This guideline does not apply to workplace exposures to asbestos, lead, radiation, welding fumes, noise, biological, or other chemicals or materials as those are covered elsewhere.

3. Definitions

- a. Action Level: An Occupation Health and Safety Administration (OSHA)-designated concentration in 29 CFR part 1910 for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.
- b. Chemical Hygiene Plan: A written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace.
- c. Chemical Inventory Holder: Faculty or staff designated by the University to possess and conduct activities with hazardous materials. The hazardous material inventory holder is accountable for all compliance and safety issues relating to possession and use of hazardous materials.
- d. Hazard Communication Program (HAZCOM): A program used to make employees aware of the safety and health hazards associated with chemical substances produced, used, or transported through their facilities.
- e. Occupational Safety and Health Administration (OSHA): A federal agency of the United States that regulates workplace safety and health.

- f. OSHA Regulated Carcinogens: A list of chemicals identified by OSHA as known carcinogens. This list includes:
 4-Nitrobiphenyl, (CAS No. 92-93-3)
 alpha-Naphthylamine, (CAS No. 134-32-7)
 methyl chloromethyl ether, (CAS No. 107-30-2)
 3,3'-Dichlorobenzidine, and its salts (CAS No. 91-94-1)
 bis-Chloromethyl ether (CAS No. 542-88-1)
 beta-Naphthylamine (CAS No. 91-59-8)
 Benzidine (CAS No. 92-87-5)
 4-Aminodiphenyl (CAS No. 92-67-1)
 Ethyleneimine (CAS No. 151-56-4)
 beta-Propiolactone (CAS No. 57-57-8)
 2-Acetylaminofluorene (CAS No. 53-96-3)
 4-Dimethylaminoazo-benzene (CAS No. 60-11-7)
 N-Nitrosodimethylamine (CAS No. 62-75-9)
- g. Other Regulated Carcinogens: A list of chemicals identified as known carcinogens. This list includes:
 Acrylonitrile (CAS No. 107-13-1)
 Arsenic (CAS No. 7440-38-2)
 Benzene (CAS. NO. 71-43-2)
 Butadiene (CAS No. 106-99-0)
 Cadmiun (CAS No. 7440-43-9)
 Carbon tetrachloride (CAS No. 56-23-5)
 Formaldehyde (CAS No. 50-00-0)
 Ethylene dibromide (CAS No. 106-93-4)
 Ethylene oxide (CAS No. 75-21-8)
 Methylene chloride /dichloromethane (CAS No. 75-09-2)
 Methylenedianiline (CAS No. 101-77-9)
 Vinyl chloride (CAS No. 75-01-4)
- h. Permissible Exposure Limit (PEL): The maximum amount or concentration of a chemical that a worker may be exposed to under OSHA regulations, calculated as an eight-hour time-weighted average.
- i. Personnel: Any persons, including both employees and students, with exposure to chemicals as specified in this guideline.
- j. Safety Data Sheets (SDS): A document provided by a chemical manufacturer that includes information such as the properties of each chemical; the physical, health, and environmental health hazards; protective measures; and safety precautions for handling, storing, and transporting the chemical.
- k. Time-Weighted Average (TWA): a person's average airborne exposure to a specified contaminant in any 8-hour work shift of a 40-hour work week.

4. Roles and Responsibilities

- a. Carnegie Mellon University Environmental Health and Safety (EHS) is responsible for:
 - i. Developing the written Chemical Exposure Monitoring Guideline and revising the document as necessary;
 - ii. Developing the written Chemical Hygiene Plan and revising the document as necessary;
 - iii. Developing all relevant training materials and revising those as necessary;
 - iv. Reviewing chemical inventories as specified in this guideline;
 - v. Conducting chemical exposure monitoring as specified in this guideline;
 - vi. Conducting hazard assessments as specified in this guideline;
 - vii. Communicating results of exposure assessments to monitored personnel within 15 days of result receipt;
 - viii. Documenting and maintaining records as required of chemical exposure monitoring and hazard assessment documentation; and
 - ix. Evaluating the effectiveness of exposure control methods based on chemical exposure monitoring results.
- b. Departments are responsible for:
 - i. Understanding and complying with the requirements of this guideline;
 - ii. Contacting CMU EHS if assistance is needed.
- c. Chemical Inventory Holders are responsible for:
 - i. Understanding and complying with the requirements of this guideline, the Chemical Hygiene Plan, and the Hazard Communication Plan as applicable;
 - ii. Maintaining chemical inventories as specified in the Chemical Hygiene plan;
 - iii. Ensuring all employees have received required training as specified in the Chemical Hygiene Plan and/or Hazard Communication Plan;
 - iv. Ensuring all employees know how to access safety data sheets for all chemicals in the area;
 - v. Communicating to EHS any significant changes regarding chemical use, inventory, or equipment;
 - vi. Reporting to EHS any failure or malfunction of chemical fume hoods, or other chemical exposure control equipment;
 - vii. Reporting immediately to EHS any unusual signs or symptoms arising from working with chemicals;
 - viii. Reporting to EHS known or suspected chemical exposures.
- d. Personnel are responsible for:
 - i. Understanding and complying with the requirements of this guideline, the Chemical Hygiene Plan, and the Hazard Communication Plan as applicable;
 - ii. Completing training as specified in the Chemical Hygiene Plan and/or Hazard Communication Plan;

- iii. Understanding how to access safety data sheets for all chemicals in the area;
- iv. Reporting to EHS any failure or malfunction of chemical fume hoods, or other chemical exposure control equipment;
- v. Reporting immediately to EHS any unusual signs or symptoms arising from working with chemicals;
- vi. Reporting to EHS known or suspected chemical exposures;
- vii. Partnering with EHS by participating in hazard assessments and chemical exposure monitoring.

5. Monitoring Procedures and Frequency

- a. Initial monitoring
 - i. Initial chemical exposure monitoring will be conducted to determine exposures to chemicals subject to this guideline when:
 - 1. There are new chemical use or storage areas;
 - 2. There are significant changes to existing spaces or chemical use processes; or
 - 3. There has been no baseline chemical exposure monitoring conducted.
 - ii. A hazard assessment will be conducted and documented using Appendix A.
 - iii. During the inventory of new chemical use or storage areas, and where there are no chemicals subject to this guideline, this absence will be documented using Appendix A and monitoring will not be required.
 - iv. Exposure assessments will be communicated to monitored personnel within 15 days of result receipt and the results will be compared to the action level and PEL for that substance.
 - v. If monitoring results exceed the action level or PEL, EHS will evaluate the effectiveness of exposure control methods and make recommendations for improvements to applicable parties.
- b. Periodic Monitoring
 - i. Periodic chemical exposure monitoring will be conducted when initial monitoring results are at or exceed the action level for the monitored substance.
 - ii. In addition, the following will be conducted:
 - 1. EHS will annually review chemical inventories for the chemicals outlined in this guideline.
 - 2. Based on this review, communication will be sent to chemical inventory holders and/or their designee for the purposes of:
 - a. Verifying the presence of the chemical in their inventory;
 - b. Determining the frequency of use; and
 - c. Determining the typical mass, volume, or concentration of the chemical used.

3. Chemical exposure monitoring and a hazard assessment will be conducted and documented if:
 - a. There have been significant increases in frequency of use, and/or
 - b. There have been significant increases in mass, volume, or concentrations of chemical use.
 4. Exposure assessments will be communicated to monitored personnel within 15 days of result receipt and the results will be compared to the action level and PEL for that substance.
 5. If monitoring results exceed the action level or PEL, EHS will evaluate the effectiveness of exposure control methods and make recommendations for improvements to applicable parties.
- c. Termination of Monitoring
 - i. Chemical exposure monitoring shall be terminated if initial monitoring results are below the action level or when:
 1. There have been no significant increases in frequency of use, and/or
 2. There have been no significant increases in typical mass, volume, or concentrations of chemical use.
 - d. Training
 - i. Training on the contents of this guideline will be provided during Laboratory Safety Training
 - ii. Training must be completed within a reasonable timeframe after it has been initially identified that personnel will be working with applicable chemicals.
 - e. Recordkeeping
 - i. Hazard Assessments and chemical exposure monitoring results will be maintained by EHS, and records kept for 30 years past the last day of employment.
 - f. Guideline Revisions
 - i. This guideline shall be reviewed annually and updated as necessary to reflect current changes in regulations, standards, guidelines, and other information as recommended by applicable regulatory and voluntary agencies.

6. Revisions

Date	Documented Changes	Initials
10/27/2020	Updated Format	MAS

For additional questions or concerns please contact EHS: safety@andrew.cmu.edu

Appendix A

Hazard Assessment Form

Contact Name		Date	
Department			
Location/Address			
Email		Phone	

Job Task(s)

1.	3.	5.
2.	4.	6.

Frequency of task

Daily <input type="checkbox"/>	Weekly <input type="checkbox"/>	Monthly <input type="checkbox"/>	Emergency only <input type="checkbox"/>	Other (Please specify)
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Please list potential physical hazards associated with this task (e.g., mechanical, noise, fall, poor lighting etc.):

1.	4.	7.
2.	5.	8.
3.	6.	9.

Please list potential health hazards associated with this task (inhalation, skin irritation, respiratory issues etc.):

1.	4.	7.
2.	5.	8.
3.	6.	9.

Please list types of contaminants or hazards:

Particulate contaminants (e.g dust, fumes, mist etc)	Chemical contaminants (e.g aerosols, gas, liquid, vapor etc)	Biological contaminants (e.g molds, fungi, bacteria, bloodborne pathogens etc)	Physical risk (e.g noise, temperature)
1.	1.	1.	1.
2.	2.	2.	2.
3.	3.	3.	3.
4.	4.	4.	4.

What engineering and/or administrative controls are in place?

1.	
2.	
3.	

What other engineering and/or administrative controls could be added to reduce exposure?

1.	
2.	
3.	

What personal protective equipment is currently being used?

1.	
2.	
3.	

What other personal protective equipment is required for this task?

1.	
2.	
3.	

Recommendations
Comments

EHS Use

Contaminants							
Gas		Vapor		Physical		Radioactive	
Mist		Dust		Biological		Ergonomic	
Fumes		Other Particulates		Chemical		Carcinogenic	
PEL:							
STEL:							
TLV:							
IDLH:							
Recommendations:							
Name:							
Signature:							